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# Traditions de construction navale dans le nord de l'Adriatique dans l'Antiquité tardive : état des connaissances

Giulia Boetto

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Giulia Boetto. Traditions de construction navale dans le nord de l'Adriatique dans l'Antiquité tardive : état des connaissances. Doctoral Workshop, L'Adriatique entre Antiquité tardive et haut Moyen Âge : espace d'échange d'idées et de formes = The Adriatic between Late Antiquity and Early Middle Ages: Space of Transfer of Ideas and Forms, Université de Franche-Comté; University of Zagreb, Oct 2022, Besançon, France. <halshs-03909391>

**HAL Id: halshs-03909391**

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Submitted on 19 Jan 2023

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HAL Authorization

Institut des Sciences et Techniques de l'Antiquité

Postgraduate Doctoral Programme in Pre-Modern History, University of Zagreb

## Doctoral Workshop

*The Adriatic between Late Antiquity and Early Middle Ages*

*Space of Transfer of Ideas and Forms*

7th and 8th october 2022

UFR SLHS  
30 rue Mégevand  
Grand Salon

UNIVERSITÉ DE  
FRANCHE-COMTÉ



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UR 4011

Society for the  
Medieval Mediterranean

# Traditions de construction navale dans le Nord de l'Adriatique dans l'Antiquité tardive : état des connaissances

Giulia Boetto

Centre Camille Jullian UMR 7299

# Qu'est-ce que l'archéologie navale ?

## Un domaine de recherche

### Objet d'étude

- bateaux et navires
- construction
- fonction
- mise en œuvre
- navigation



## Historiographie

1536, Lazare de Baïf, *Annotationes... de re navali...*

XVIIe-XVIIIe, ouvrages d'érudits (Witsen 1671, Le Roy 1777...)

1840, Augustin Jal, *Archéologie navale*

Fin XIXe, études philologiques (Graser, Breusing, Vars, Cartault, Torr...)

Apport de l'ethnographie: Amiral Pâris

Début XXe, développement iconographie et ethnographie (Carlini, Poujade...)

Milieu XXe, archéologie (archéologie sous-marine... )

## Avant milieu XXe

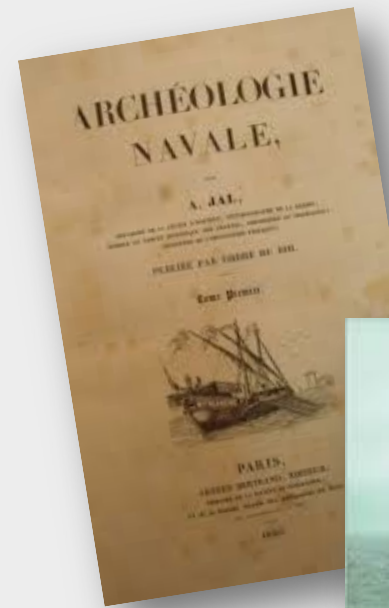
Sources écrites dominantes, iconographie faible, séparation des sources

- pas de différence de construction
- similarité des navires dans l'espace et permanence des types dans le temps
- diffusionnisme

## Après milieu Xxe

Complémentarité des sources : textes, iconographie, ethnographie, archéologie

- différence construction ( « sur bordé » ≠ « sur squelette » )
- diversité des navires dans l'espace et dans le temps
- évolutionnisme



# Définition du navire (Muckleroy 1978)

## 1) MACHINE

- Structure flottante : architecture et hydrostatique (flottabilité et stabilité) -> système architectural
- Structure mobile : propulsion, direction, performances (hydrodynamique) -> système technique

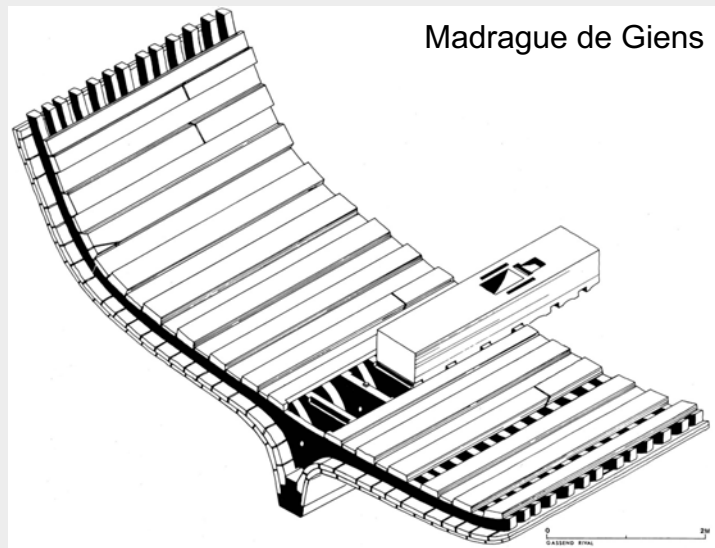
## 2) INSTRUMENT ADAPTÉ À UNE FONCTION

Adaptation particulière du système architectural et du système technique à une fonction par des aménagements particuliers (navire de guerre ou de commerce, bateau de pêche ou de servitude ...)

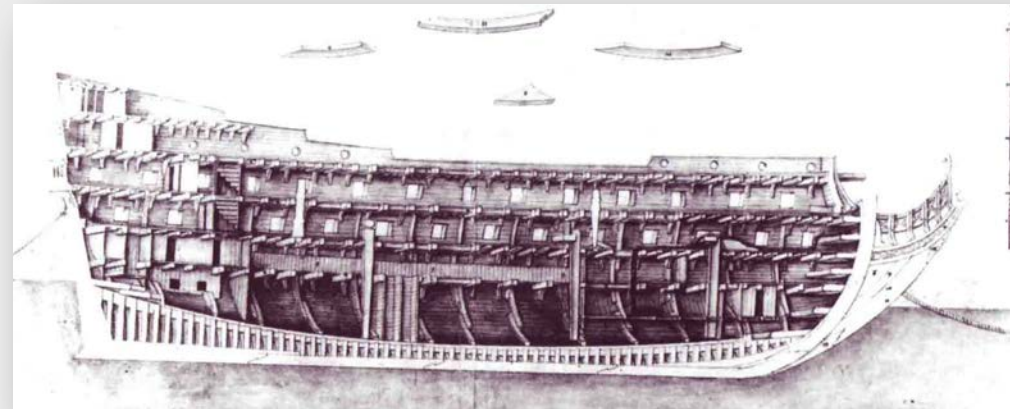
## 3) SOCIÉTÉ FERMÉE

Lieu de vie et de travail d'une micro-société...

Une communauté particulière avec ses traditions, ses modes de vie, sa religiosité



Dessin M. Rival



Vaisseau 80 canons (1670), d'après Pomey, Rieth 2005



Jules-Verne 3, cliché CNRS/CCJ

# Objectifs des études d'archéologie navale

## RESTITUTION

- *Systeme architectural*
- *Principe et méthodes de construction : de la conception à la réalisation*
- *Systeme technique*
- *Systeme fonctionnel*
- *Systeme social*

## RESTITUTION FINALE D'ENSEMBLE

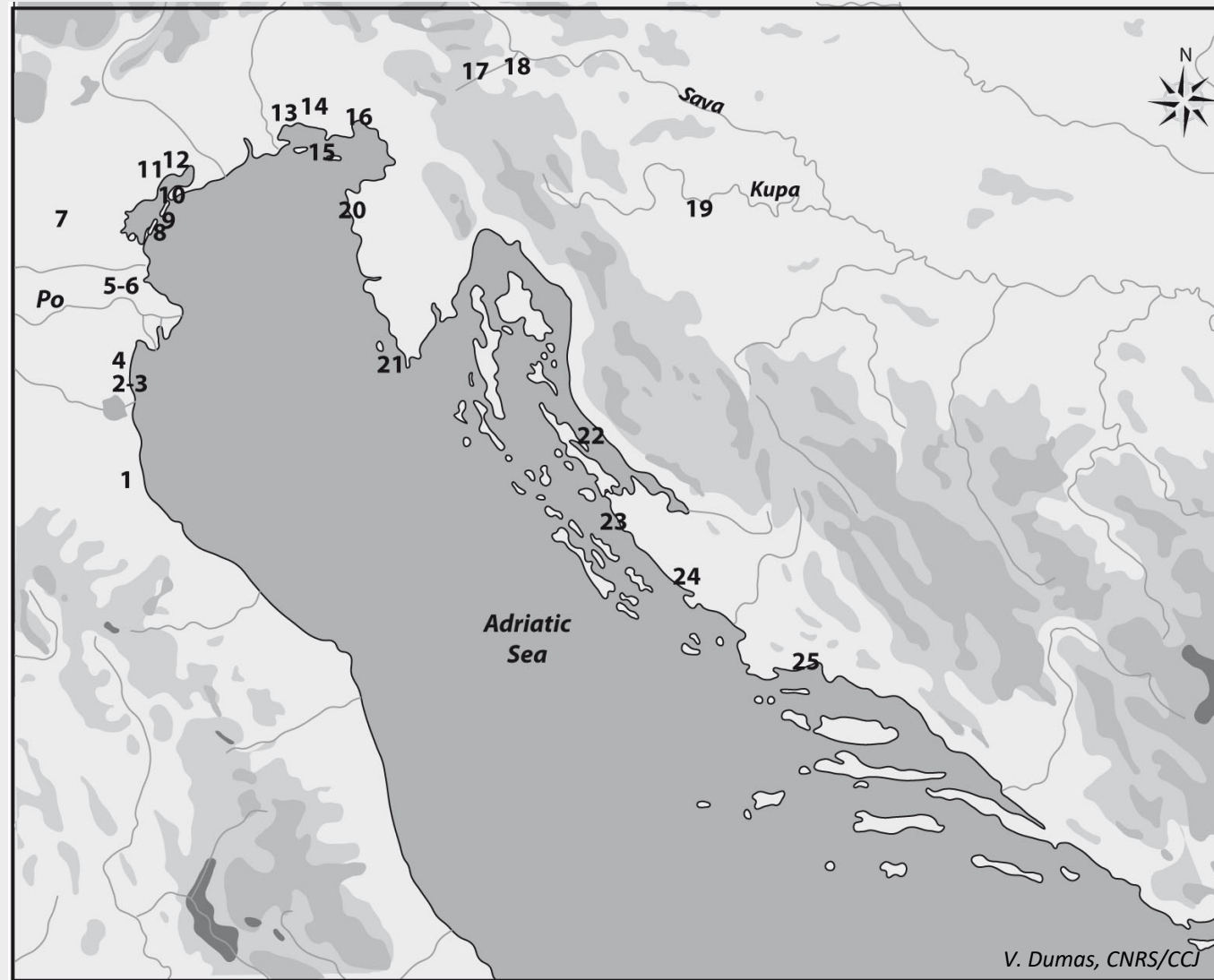
## UTILISATION ET NAVIGATION

Réplique navigante



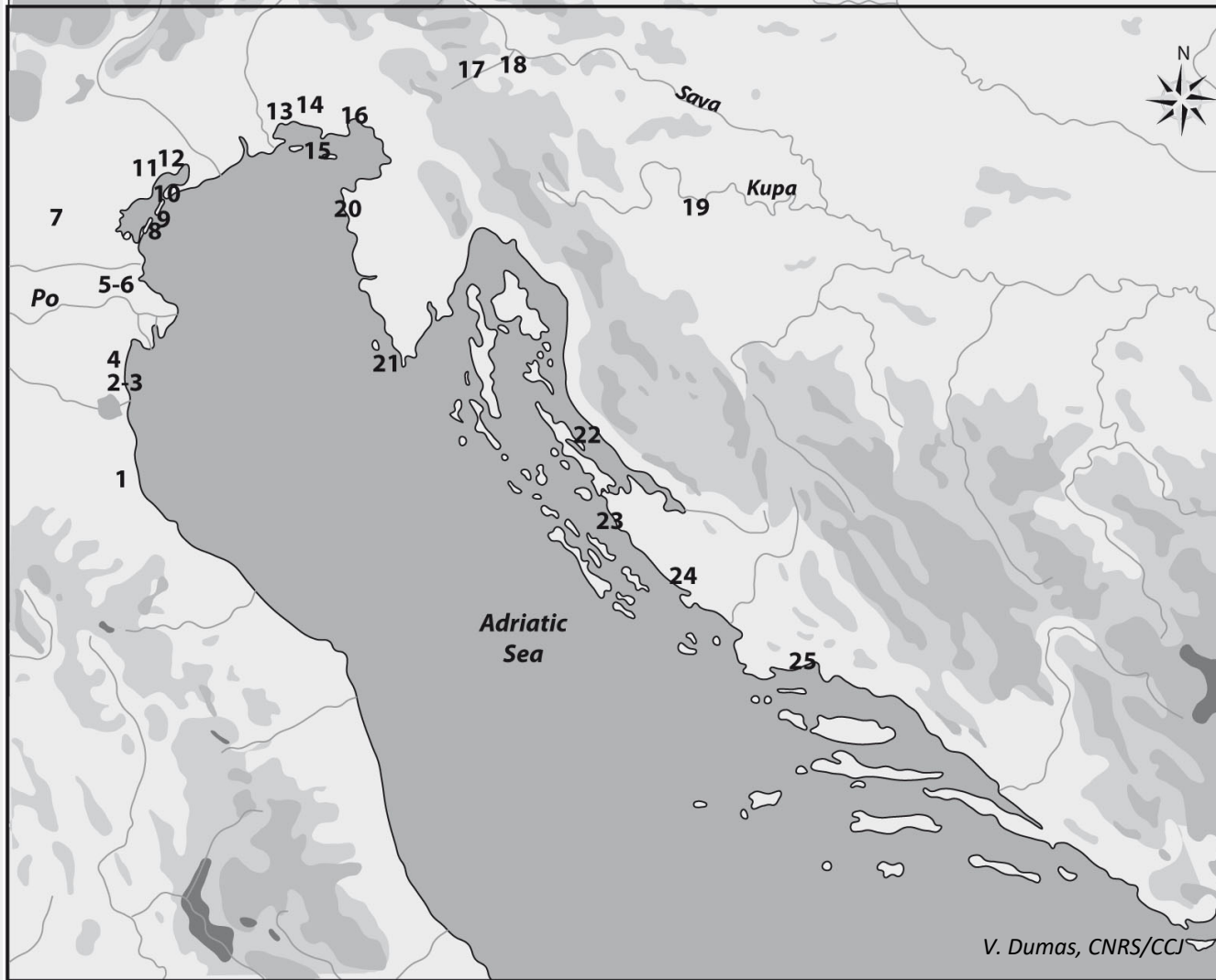
Shipwrecks found in the North-western Adriatic area (Italy), from Ravenna (Po delta) to Aquileia and in the Eastern Adriatic area (Slovenia and Croatia)

- more or less well preserved (hull bottoms, separate pieces of ship's structures)
- different levels of knowledge (fully published, on-going researches, not yet or enough studied ...)



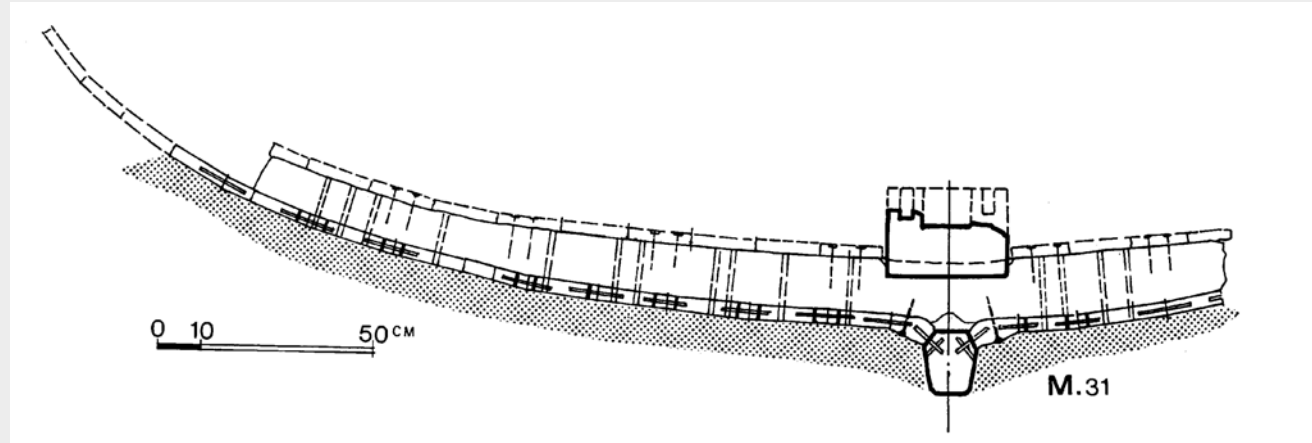
1. Cervia
2. Comacchio
3. S. Maria Padovetere
4. Pomposa
5. Motta di Cavanella d'Adige
6. Corte di Cavanella d'Adige
7. Padova
8. Alberoni, Lido di Venezia
9. S. Nicoletto, Lido di Venezia
10. S. Francesco del Deserto
11. Marcon
12. Meolo
13. Stella
14. Aquileia
15. Grado
16. Monfalcone
17. Lipe
18. Sinjia Gorica
19. Kamensko
20. Zambratija
21. Pula
22. Caska
23. Zaton/Nin
24. Pakostane
25. Trstenik, Split

## Chronology: from the Bronze Age to the Late Roman-Early Medieval time

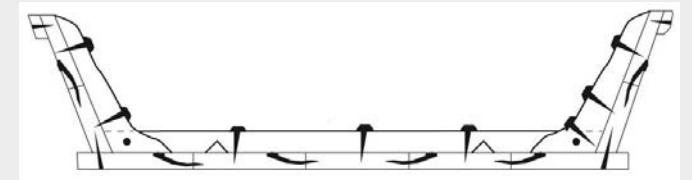
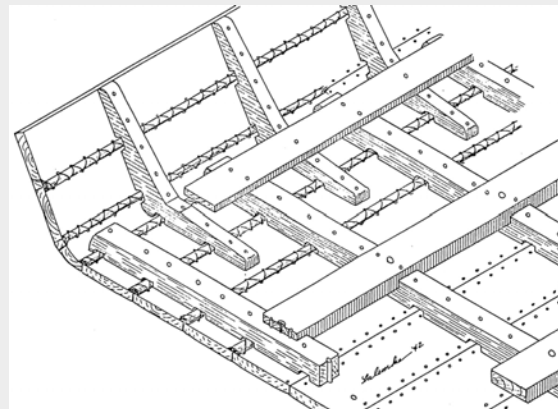
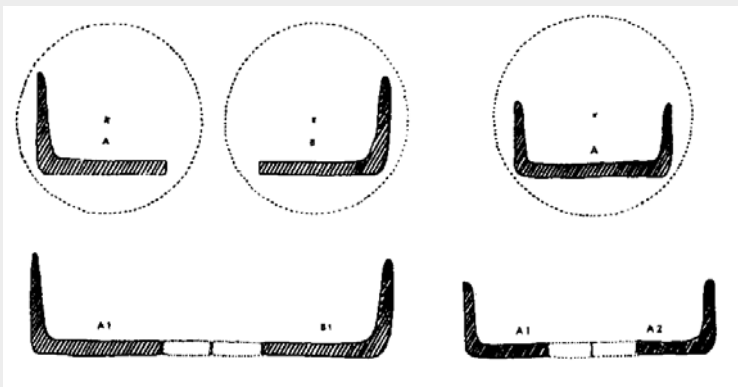


1. Cervia (7<sup>th</sup> c. AD)
2. Comacchio (end 1<sup>st</sup> c. BC)
3. S. Maria Padovetere (5<sup>th</sup> c. AD)
4. Pomposa (possibly 7<sup>th</sup> c. AD)
5. Motta di Cavanella d'Adige (end 1<sup>st</sup>-beg. 2<sup>nd</sup> c. AD)
6. Corte di Cavanella d'Adige 1-2 (end 1<sup>st</sup>-beg. 2<sup>nd</sup> c. AD)
7. Padova (before 2<sup>nd</sup> c. AD)
8. Alberoni, Lido di Venezia (1<sup>st</sup>-beg. 2<sup>nd</sup> c. AD; 1-144 AD)
9. S. Nicoletto, Lido di Venezia (Roman, prec. date unknown)
10. S. Francesco del Deserto (Roman, prec. date unknown)
11. Marcon (Roman, prec. date unknown)
12. Meolo (Roman, prec. date unknown)
13. Stella (beg. 1<sup>st</sup> c. AD)
14. Aquileia (1<sup>st</sup> c. AD & end 2<sup>nd</sup>-beg. 3<sup>rd</sup> c. AD)
15. Grado (2<sup>nd</sup> c. AD)
16. Monfalcone
17. Lipe (beg. 1<sup>st</sup> c. AD)
18. Sinjia Gorica (beg. 1<sup>st</sup> c. AD)
19. Kamensko (1<sup>st</sup>-2<sup>nd</sup> c. AD)
20. Zambratija (12<sup>th</sup> -10<sup>th</sup> c. BC; 1120-930 BC)
21. Pula 1-2 (1<sup>st</sup>-end 2<sup>nd</sup> c. AD)
22. Caska 1-4 (1<sup>st</sup> - 2<sup>nd</sup> c. AD)
23. Zaton 1-3 (1<sup>st</sup> - 2<sup>nd</sup> c. AD)
24. Pakostane (end 4<sup>th</sup> -beg. 5<sup>th</sup> c. AD)
25. Trstenik (1<sup>st</sup> - 2<sup>nd</sup> c. AD)

- Keel-based => characterized by a morphological and structural continuity between the bottom and the sides
- Zambratija, Comacchio, Grado, Monfalcone, Caska 1-2, Pula 1 & 2, Zaton 1-3 Pakostane, Trstenik

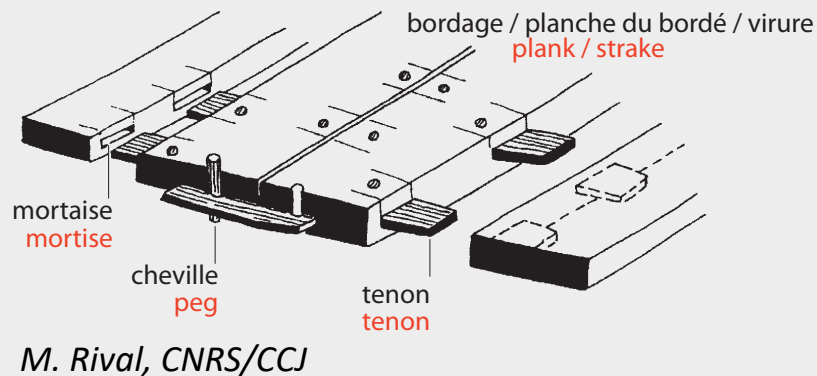


- Bottom-based => characterized by a morphological and structural discontinuity between the bottom and the sides
- Corte di Cavanella d'Adige 1-2, S. Maria Padovetere, Stella, Lipe, Sinjia Gorica, Kamensko

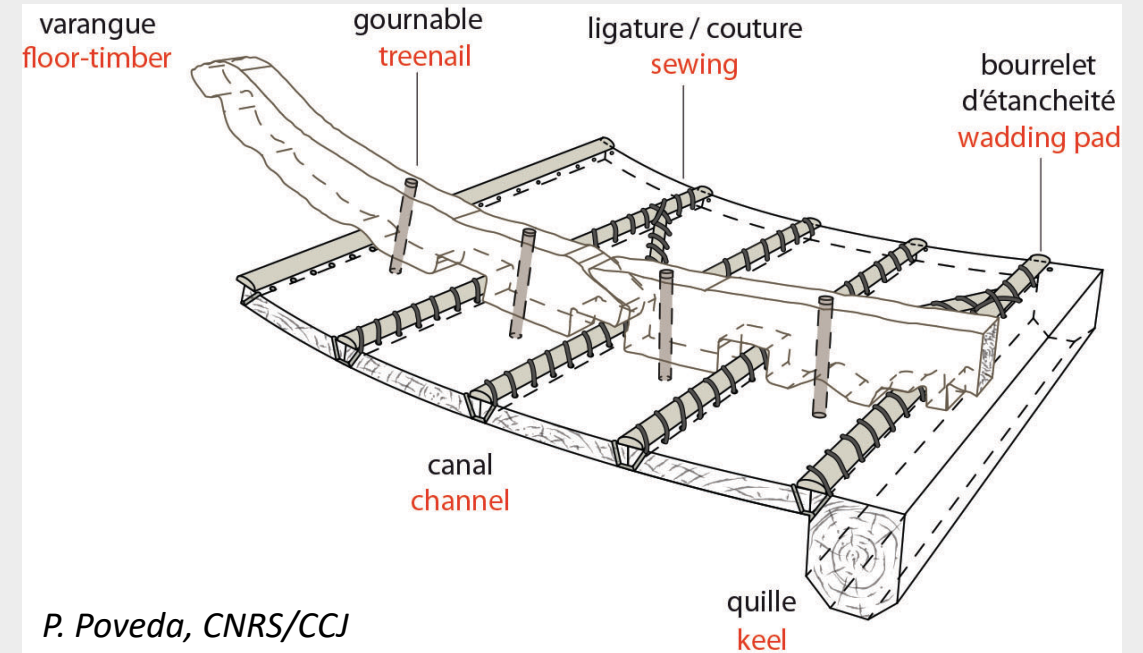


## Strakes joined together by mean of different fastening techniques

- Tenons-and-Mortise => strakes fastened using tongues (tenons) of hard wood inserted in cavities (mortises) carved at regular intervals along the edges of the planks then blocked by pegs:
- Grado, Monfalcone, Caska 2, Pakostane, Trstenik



- Sewing => strakes fastened using stiches made of a continuous length of interlocked fibers:
- Corte di Cavanella d'Adige 1-2, Stella, Zambratija, Lipe, Caska 1, 3-4, Pula 1-2, Zaton 1-3



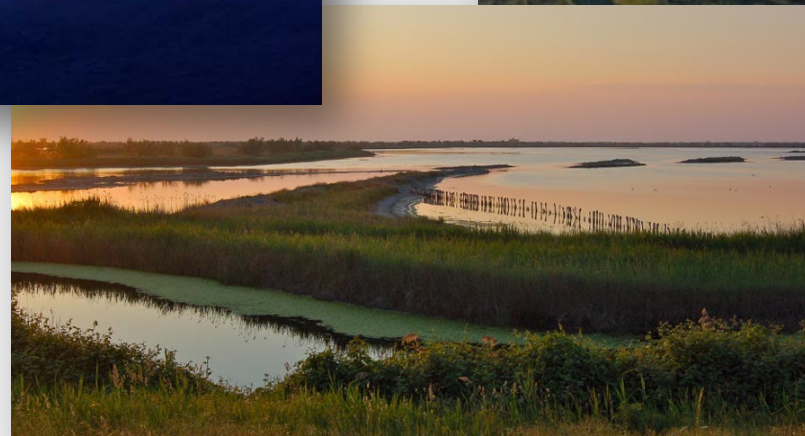
- Mixed techniques (sewings, tenons-and-mortaises)
- Comacchio, S. Maria Padovetere

## Strakes joined together by mean of different fastening techniques

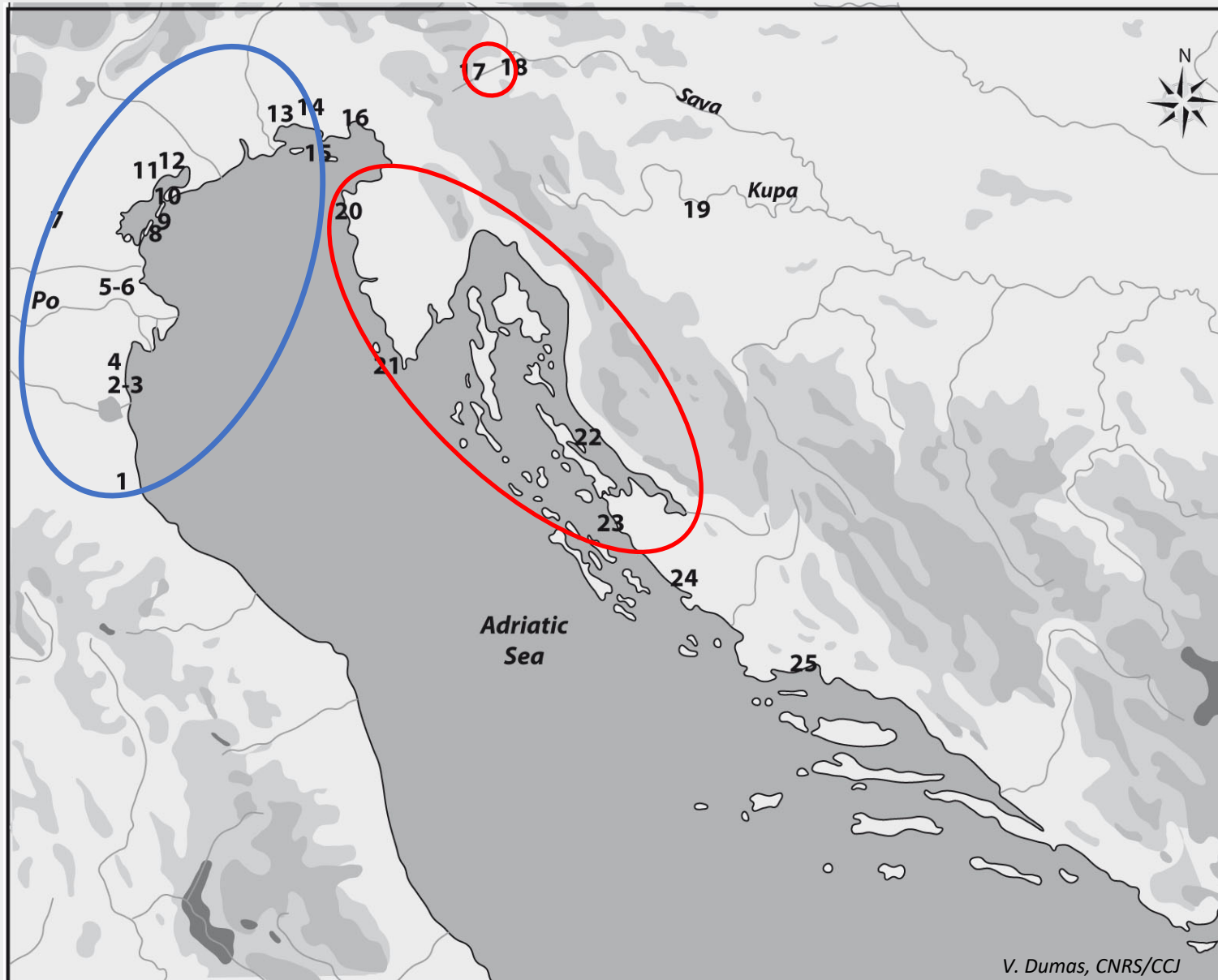
- Clamps => strakes fastened using small metallic fastenings:
- Kamensko, Sinja Gorica, Sisak ...



**Different architectural types of ships ...  
... and different functional types of ships  
adapted to different geographical transport zones (maritime, fluvio-maritime, inland ...)**



# Sewn boats in Adriatic



**The North-  
Western Adriatic  
tradition**

**The Eastern  
Adriatic tradition**



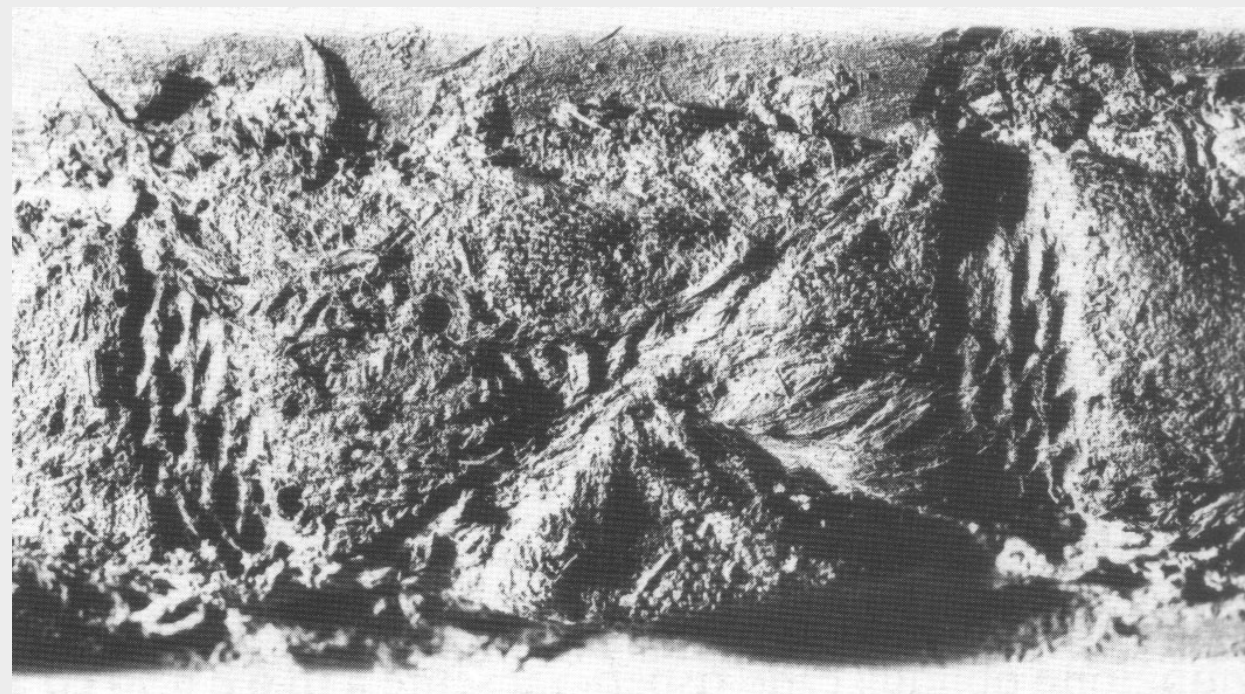
point de surjet



point croisé

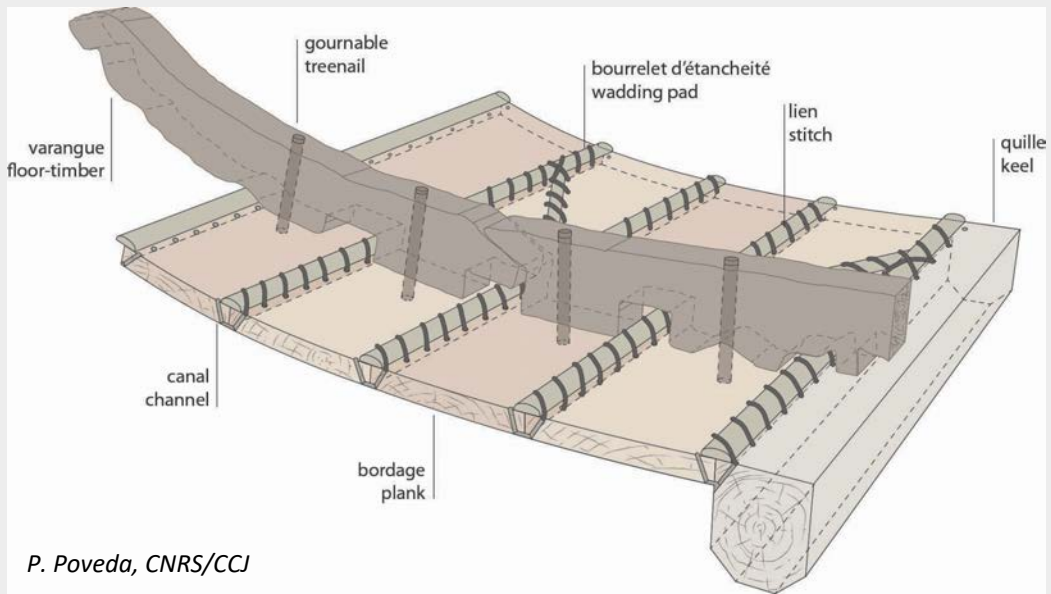


*G. Boetto, CNRS/CCJ*

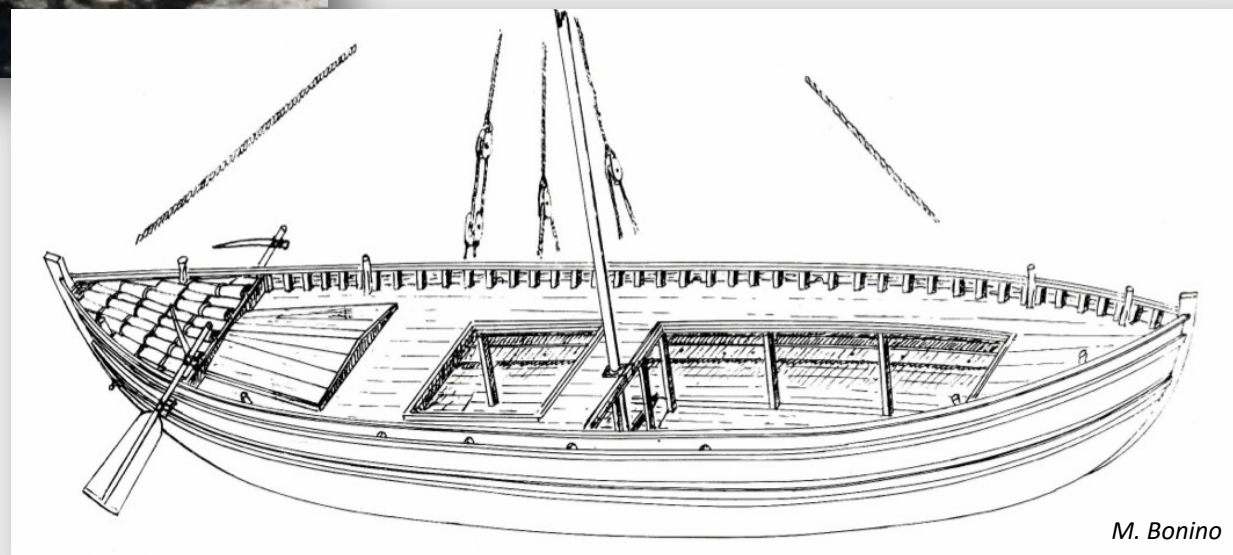
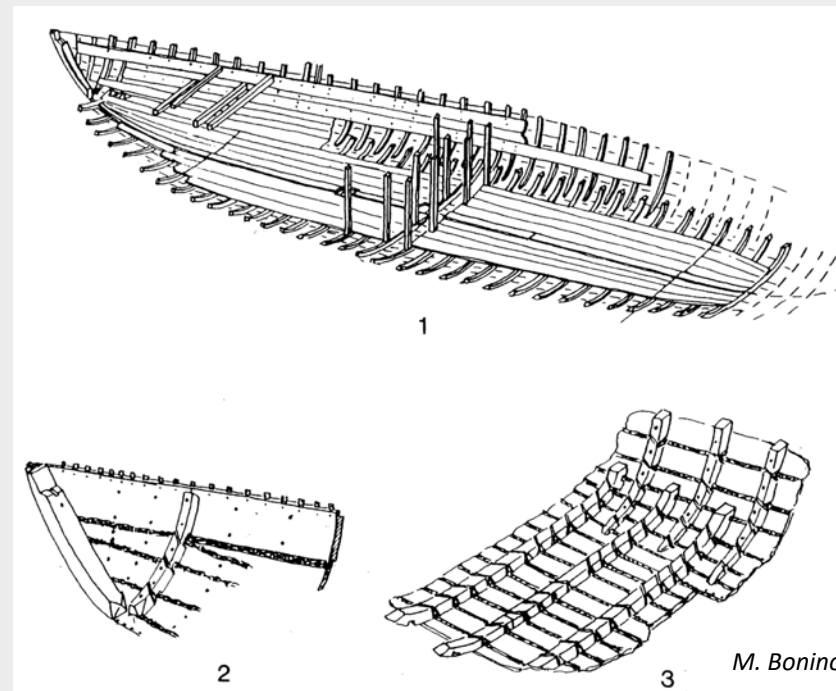
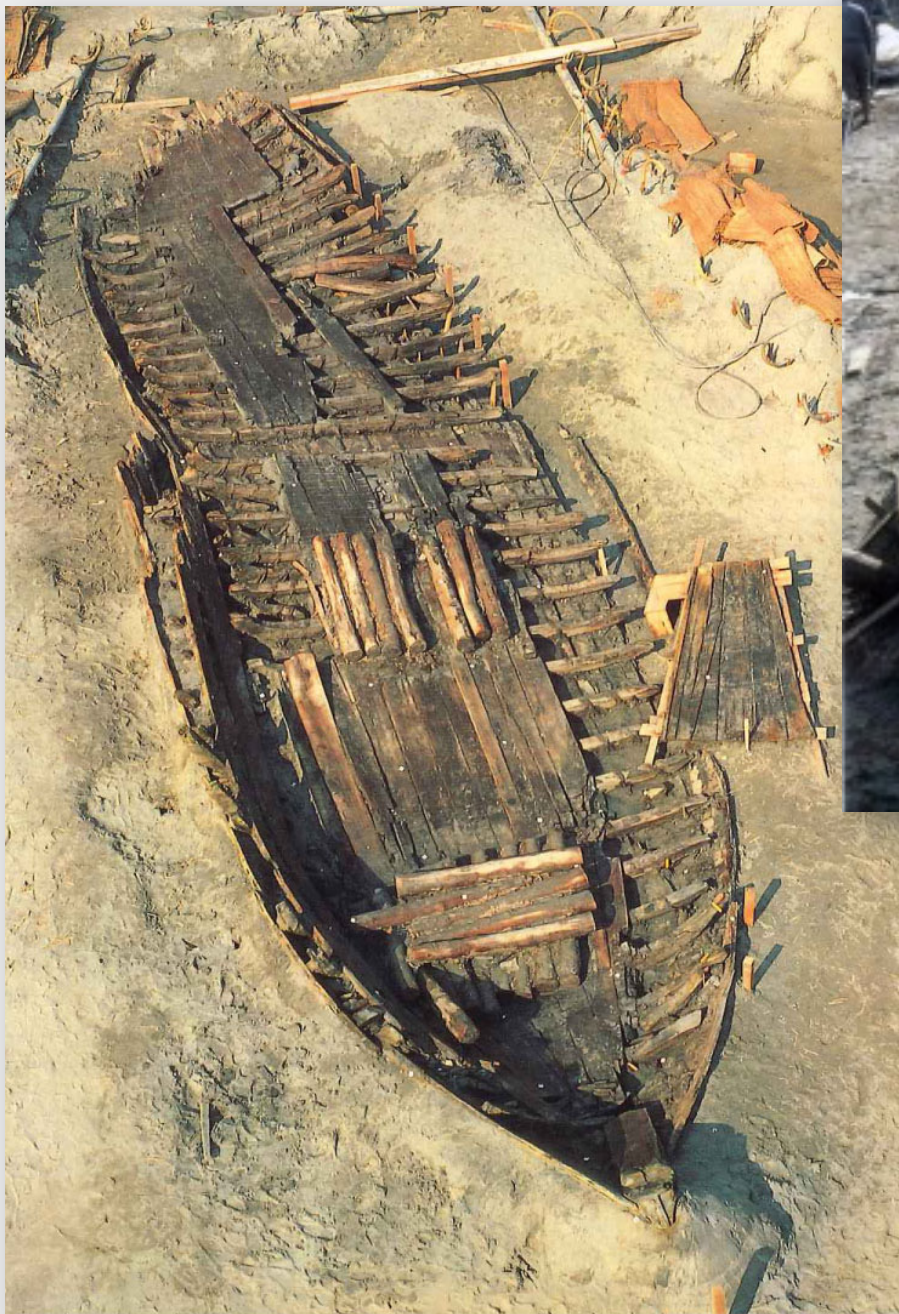


d'après Berti 1990

## Caska1, end of the 1<sup>st</sup> c. AD



Comacchio, end of the 1<sup>st</sup> c. BC



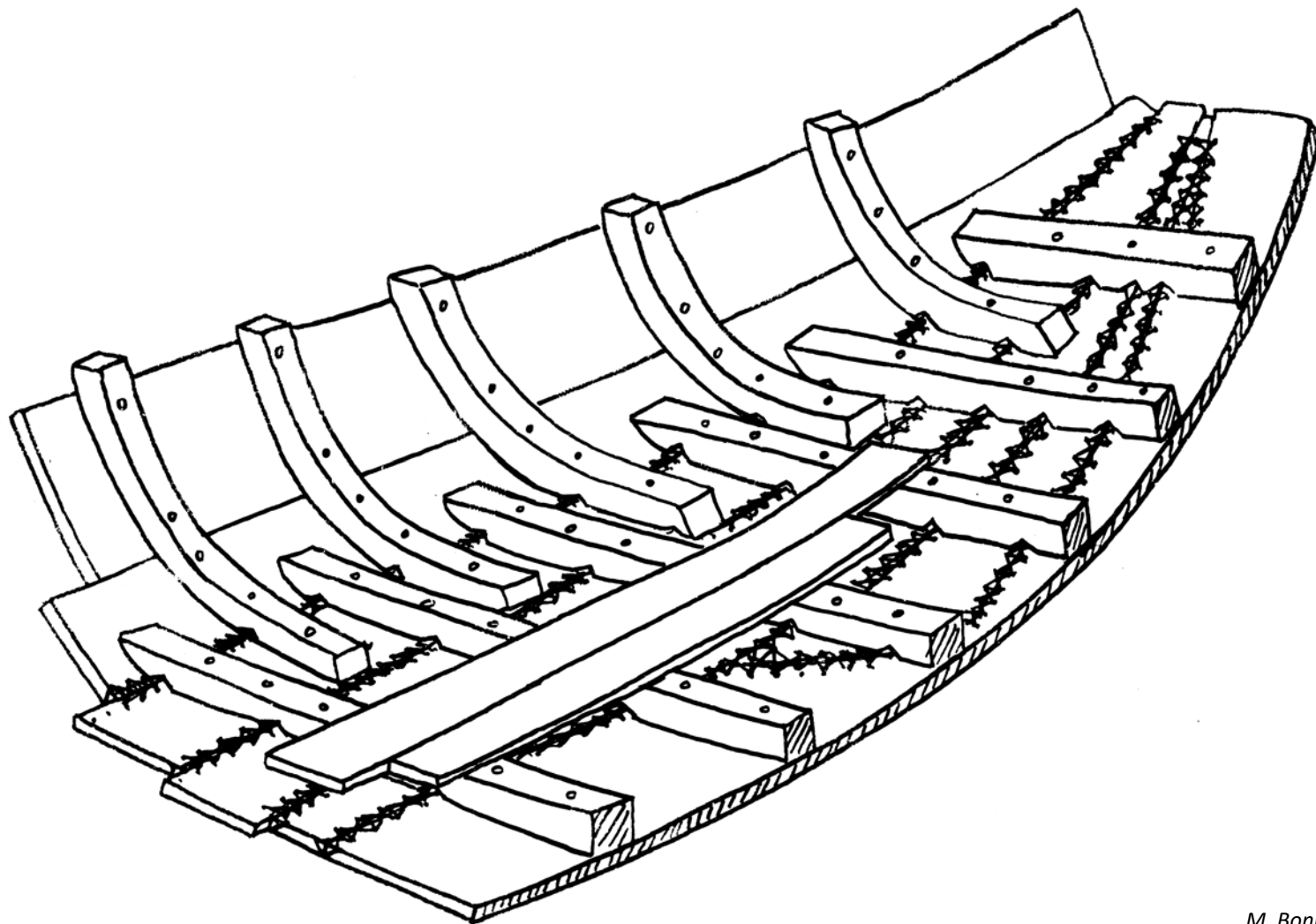
d'après Berti 1990

M. Bonino

Santa Maria in Padovetere, 5<sup>th</sup> c. AD



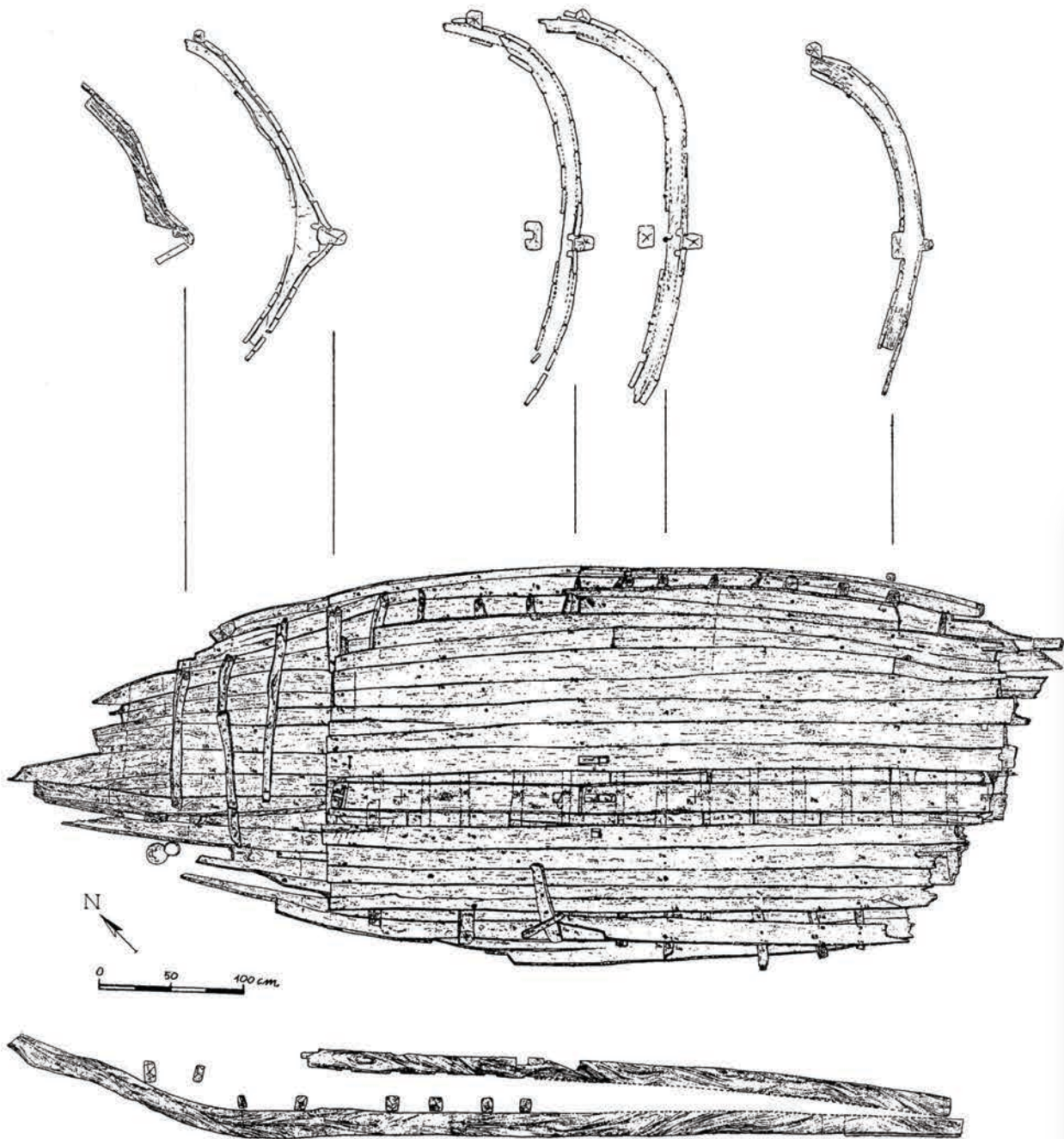
**Cervia & Pomposa**  
**7<sup>th</sup> c. AD?**



*M. Bonino*

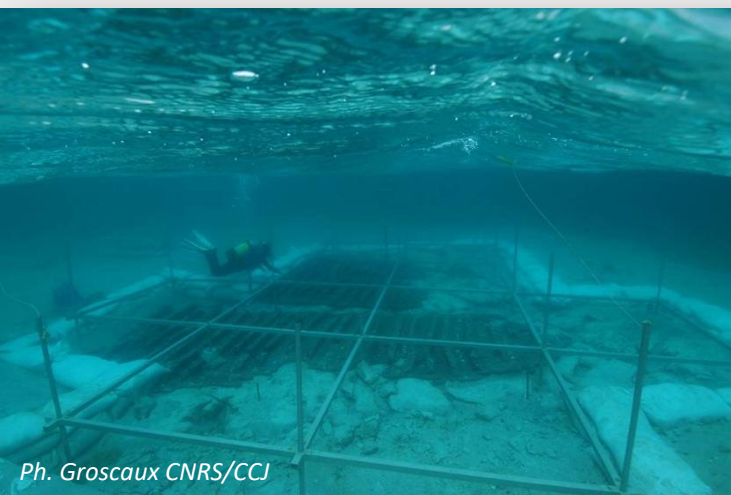
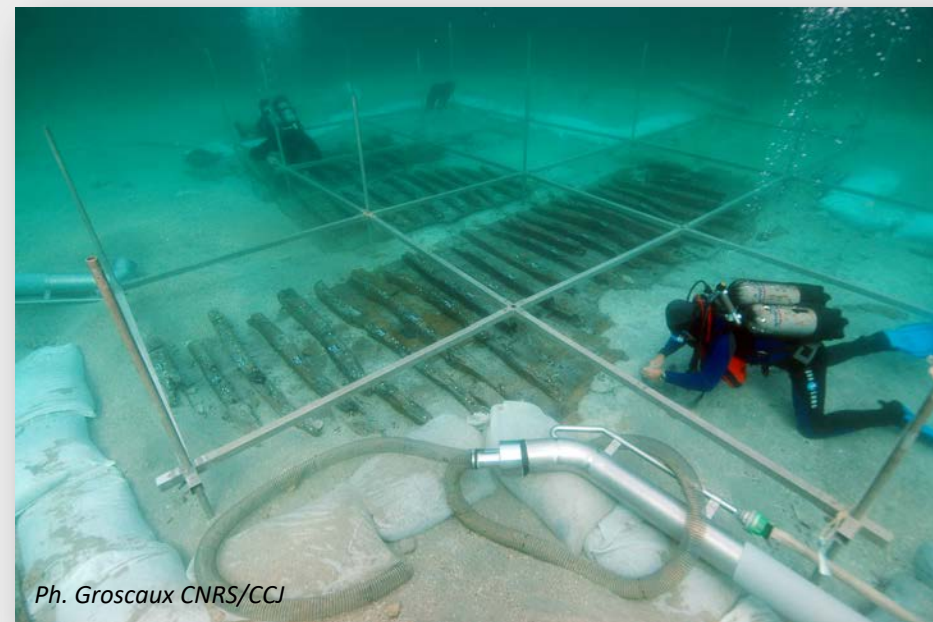
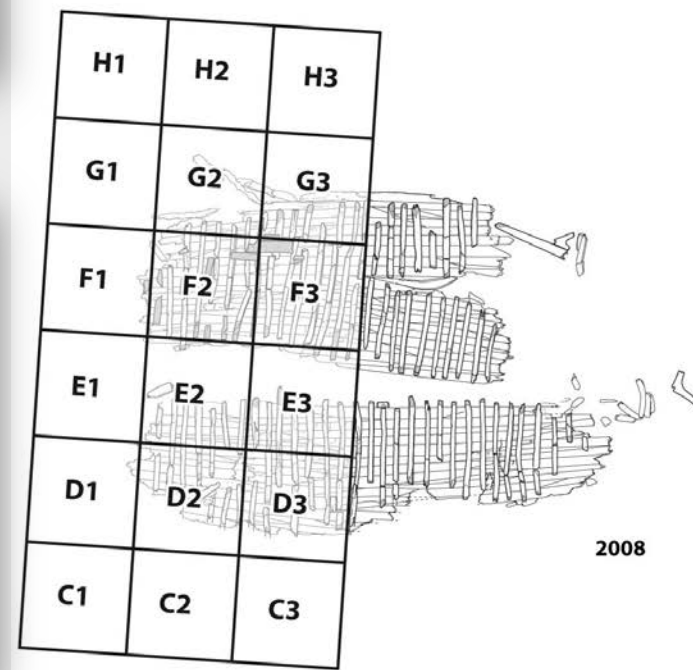
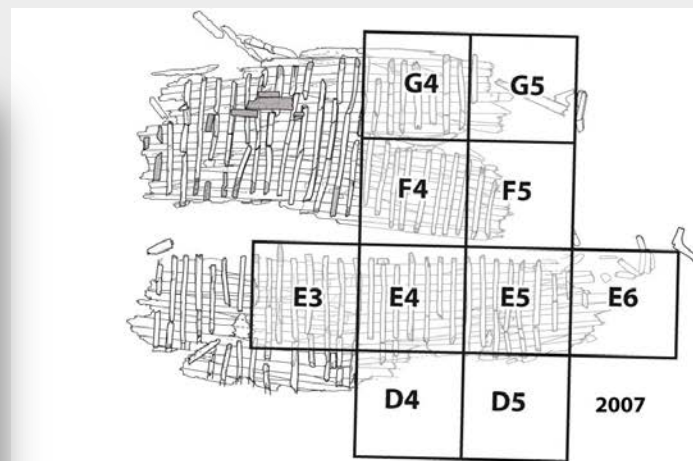
La Dorsale-Bergo

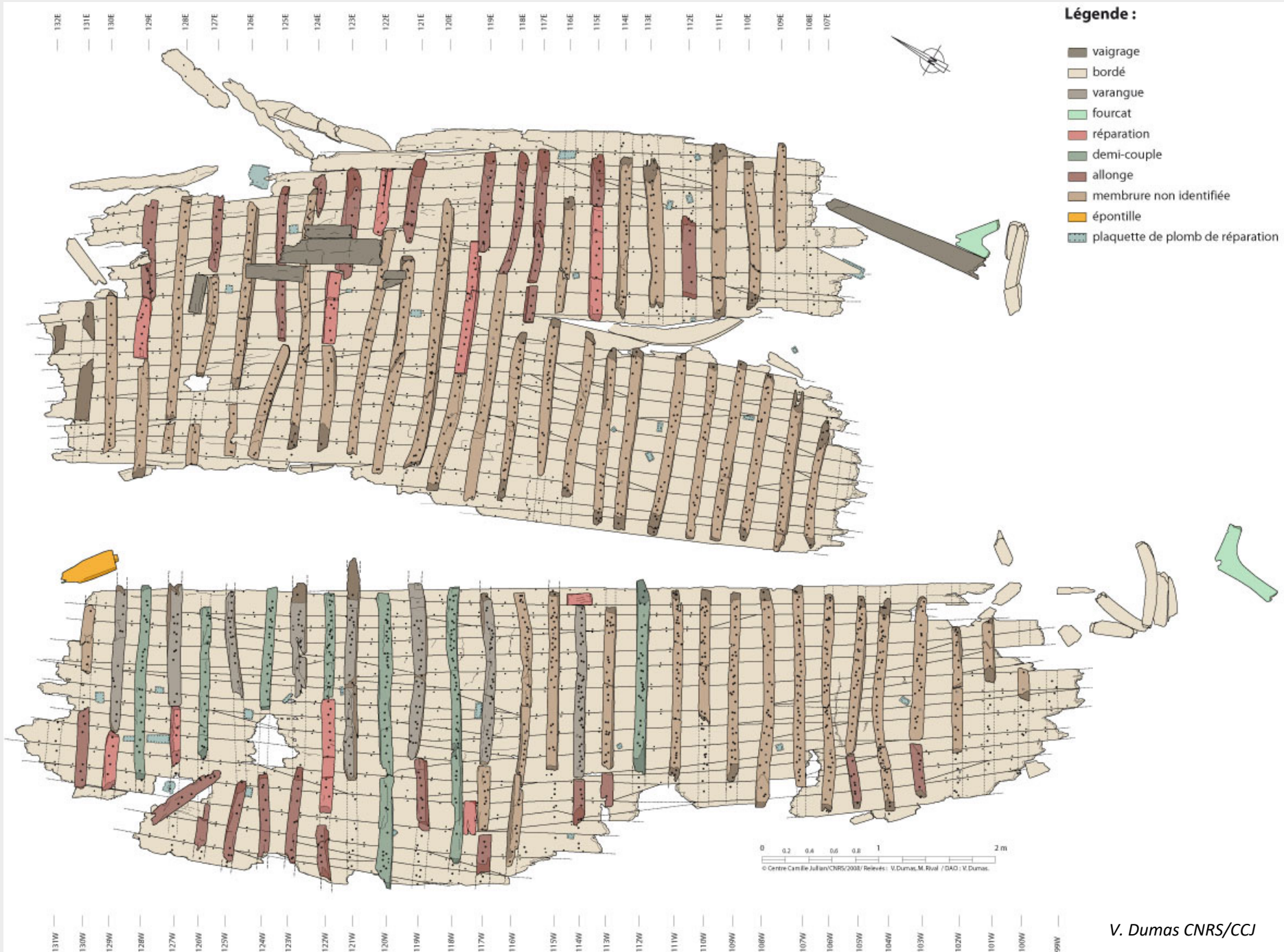
Parco Teodorico, Ravenna  
5<sup>th</sup> c. AD





# Pakostane (end 4<sup>th</sup> –beg. 5<sup>th</sup> c. AD)



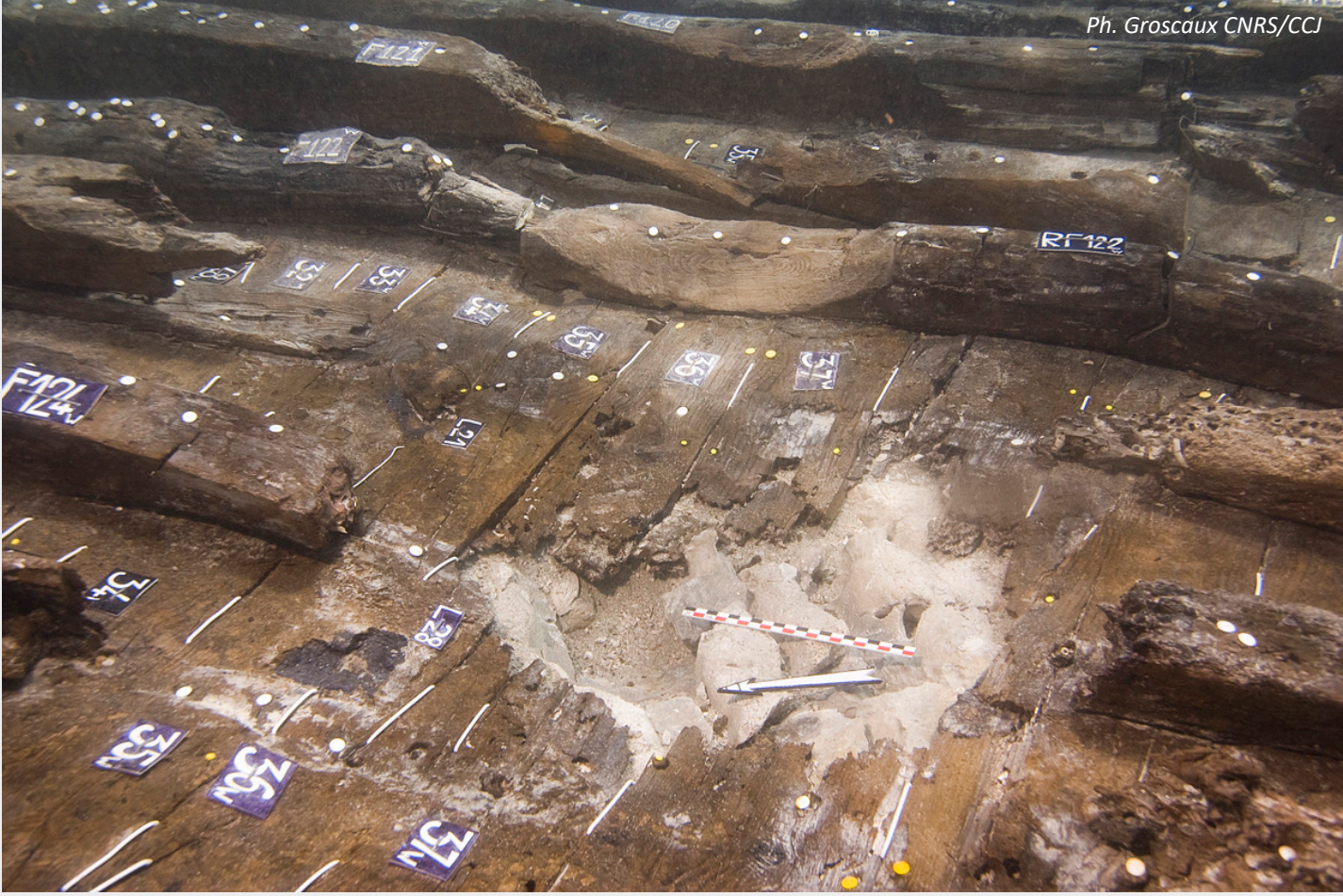




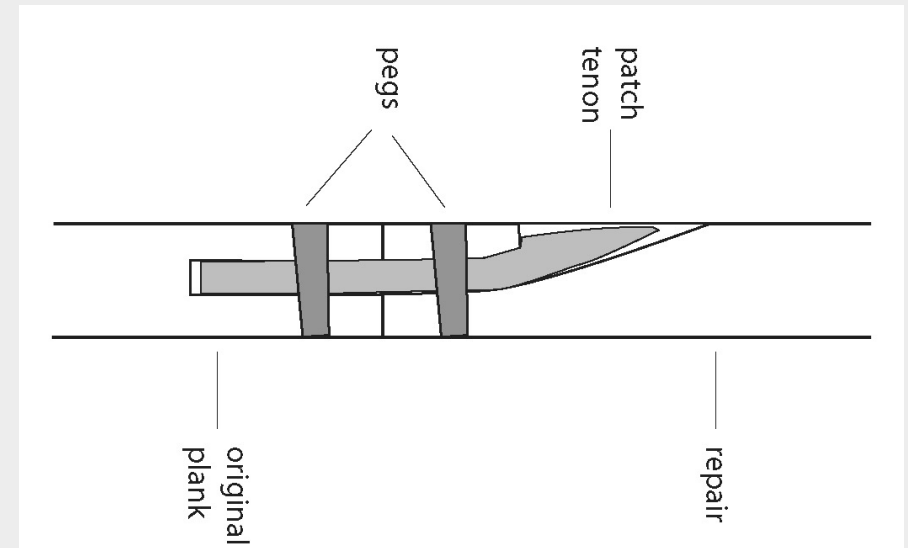
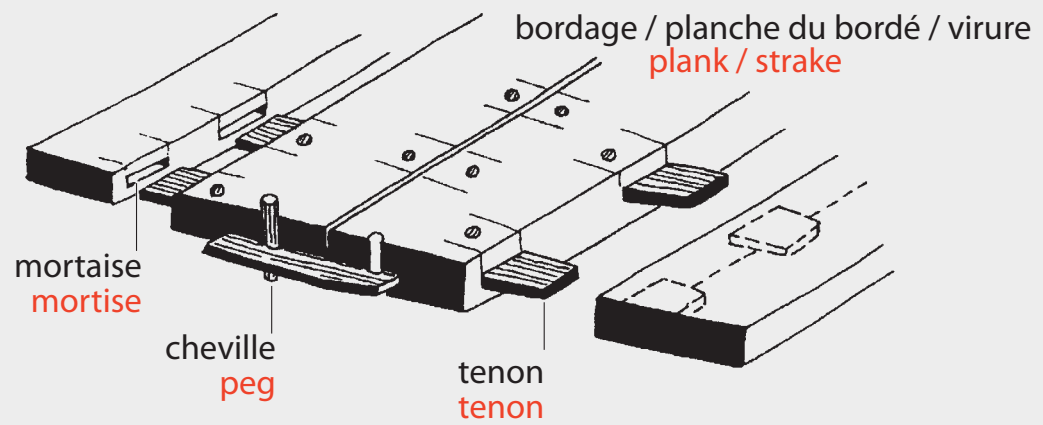
Ph. Groscaux CNRS/CCJ



Ph. Groscaux CNRS/CCJ



Ph. Groscaux CNRS/CCJ







PK 08/108

Ph. Groscaux CNRS/CCJ



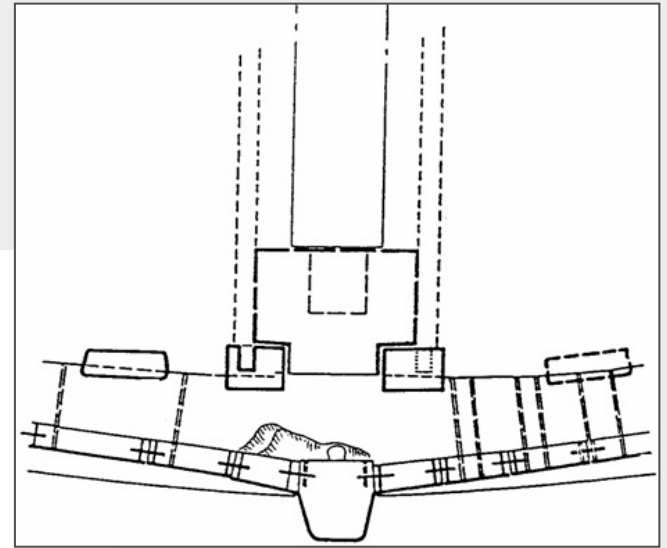
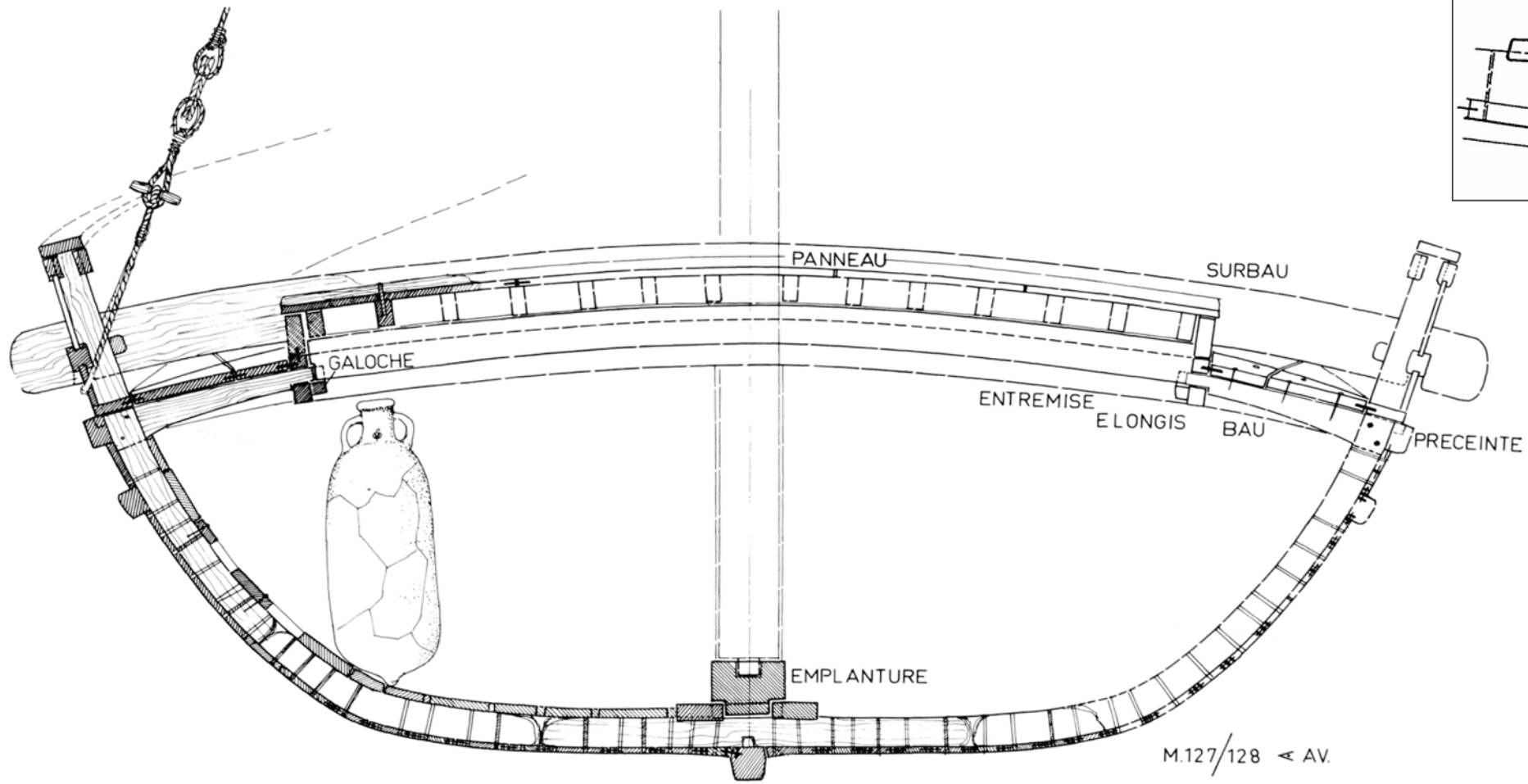
L. Damelet CNRS/CCJ



L. Damelet CNRS/CCJ



L. Damelet CNRS/CCJ



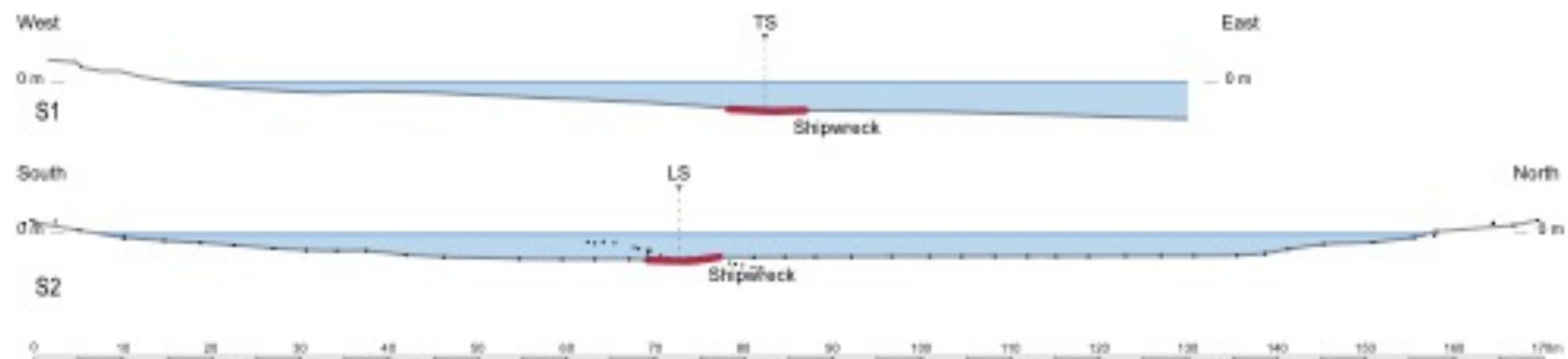
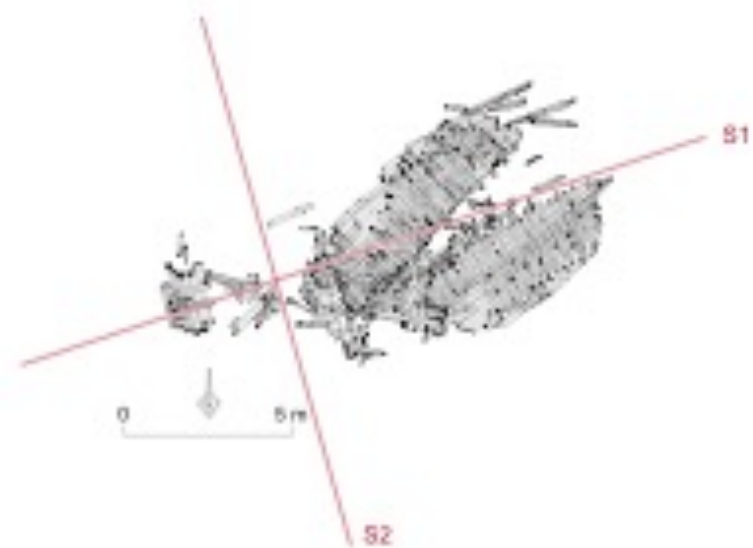
M.127/128 ← AV.

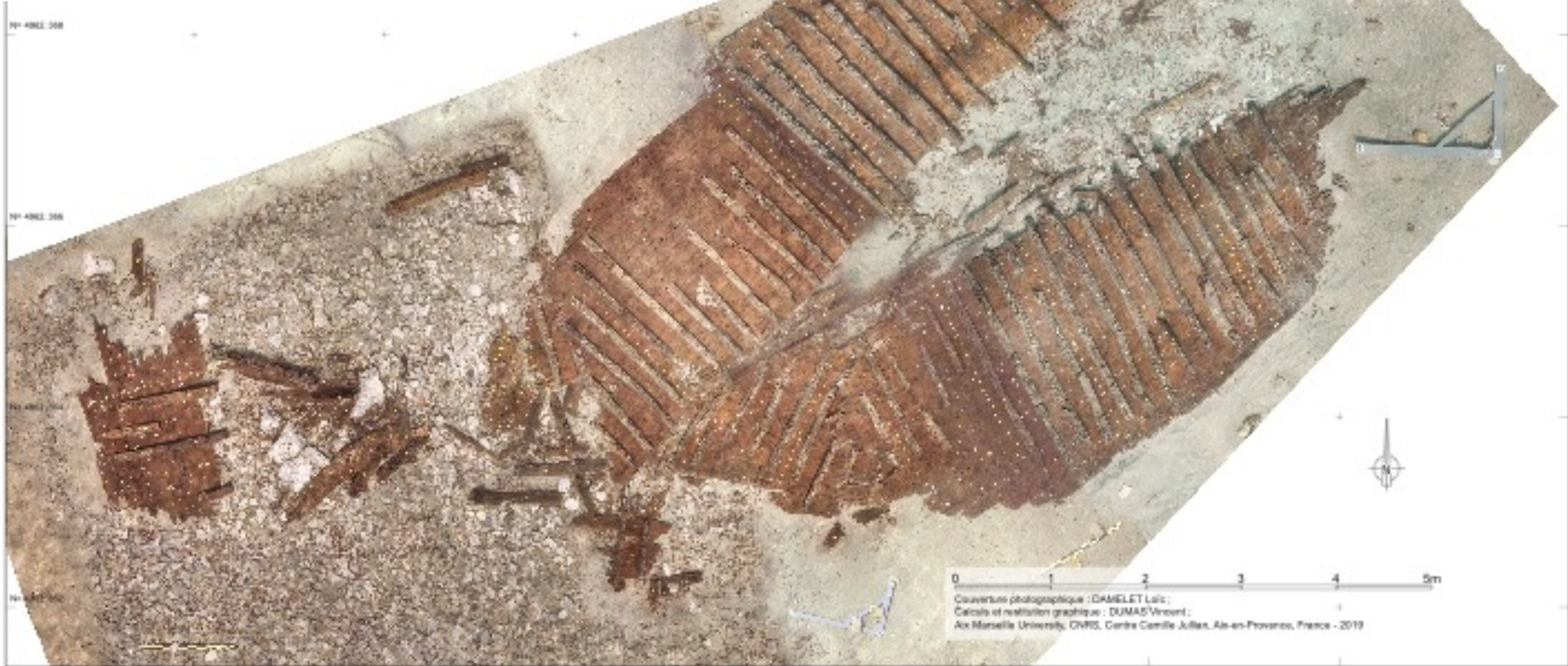
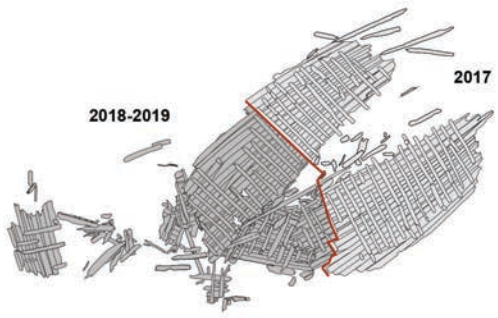
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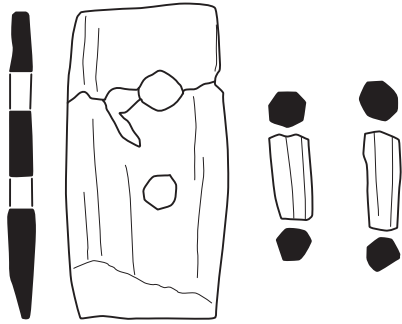
J.-M. Gassend CNRS/IRAA

## Debeljak (end 4<sup>th</sup> –beg. 5<sup>th</sup> c. AD)

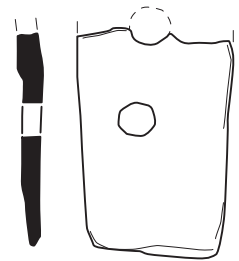




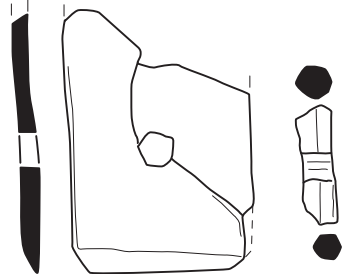




DE17 / W39a



DE17 / W39b



DE17 / W31

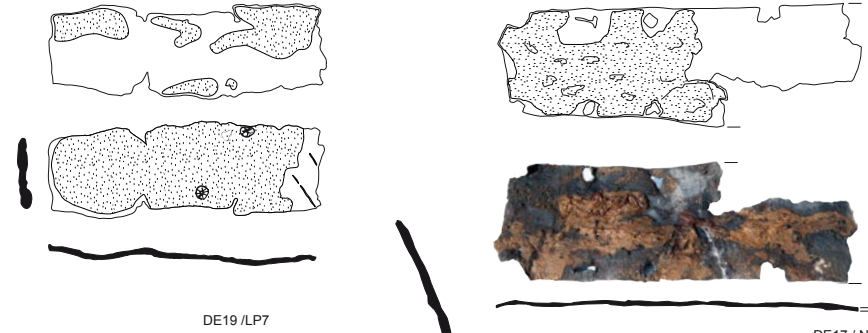


DE18 / N10

0 5cm  
G. Boetto, CNRS, CCJ



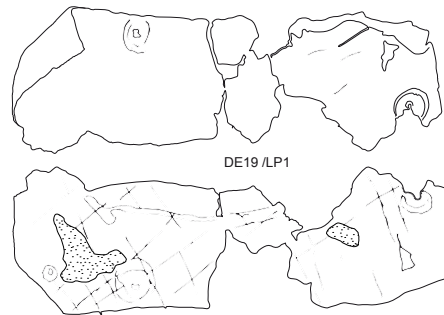
DE18 / N9



DE19 / LP7

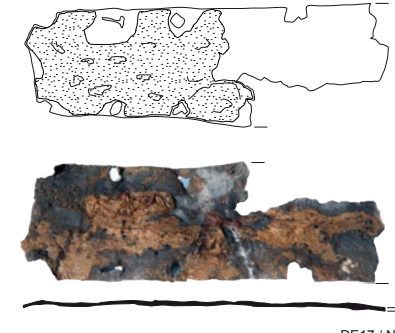


DE19 / LP3

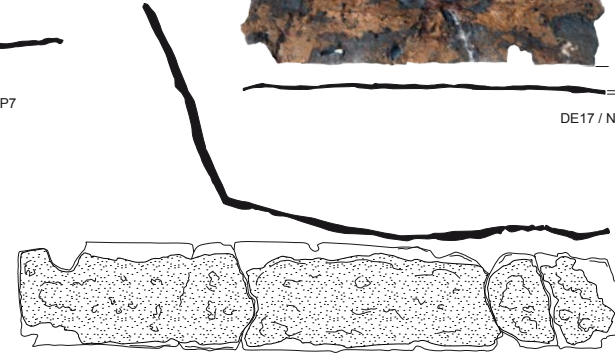


DE19 / LP1

pitch 0 5cm  
G. Boetto, P. Poveda, CNRS, CCJ



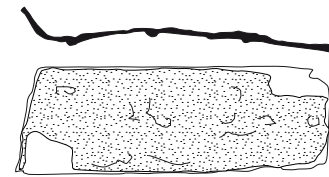
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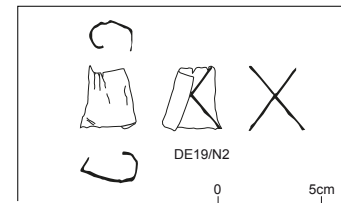
DE17 / N28



DE17 / N32



DE17 / I. N.



0 5cm

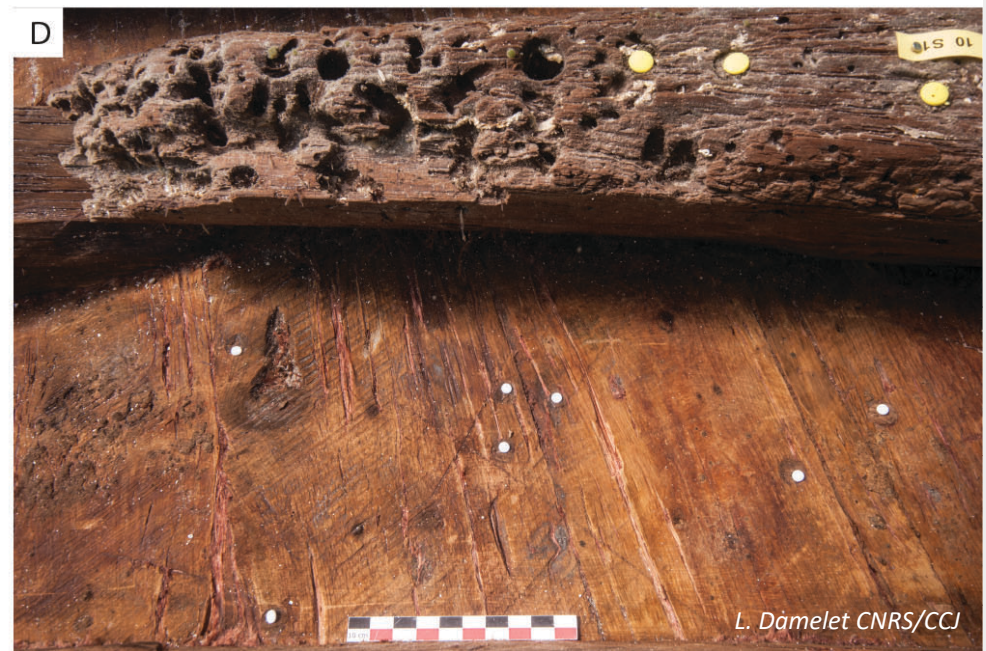
DE19/N2

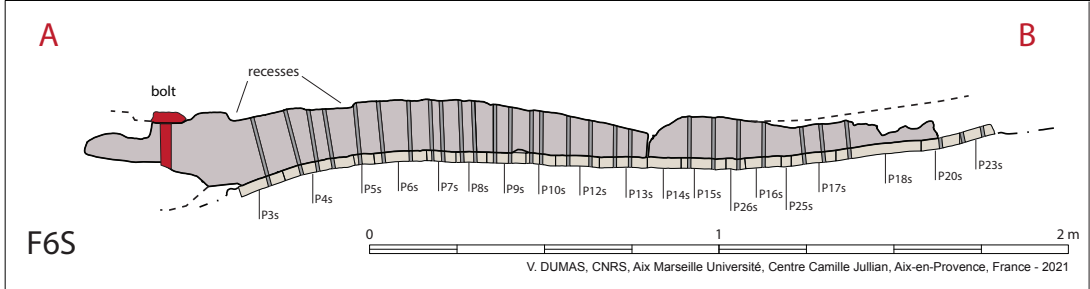
0 5cm



0 5cm

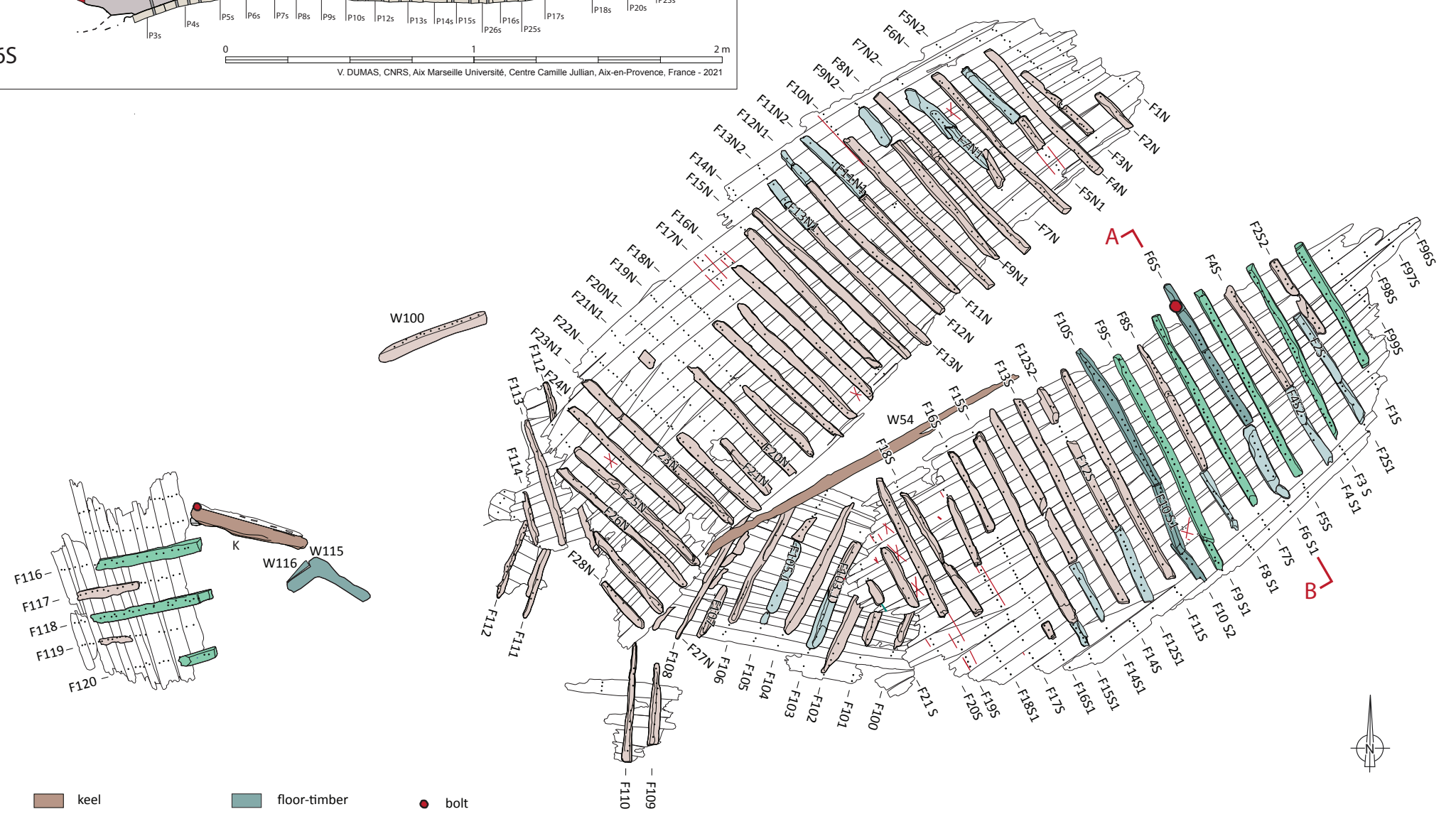
0 5cm





F6S

**B**



- keel
- planking
- frame not id.
- floor-timber
- half-frame
- futtock
- bolt
- treenail
- carpenter mark



Couverture photographique : L. DAMELET ; calculs et restitution graphique : V. DUMAS  
CNRS, Aix Marseille Université, Centre Camille Jullian, Aix-en-Provence, France - 2019





0 5 cm

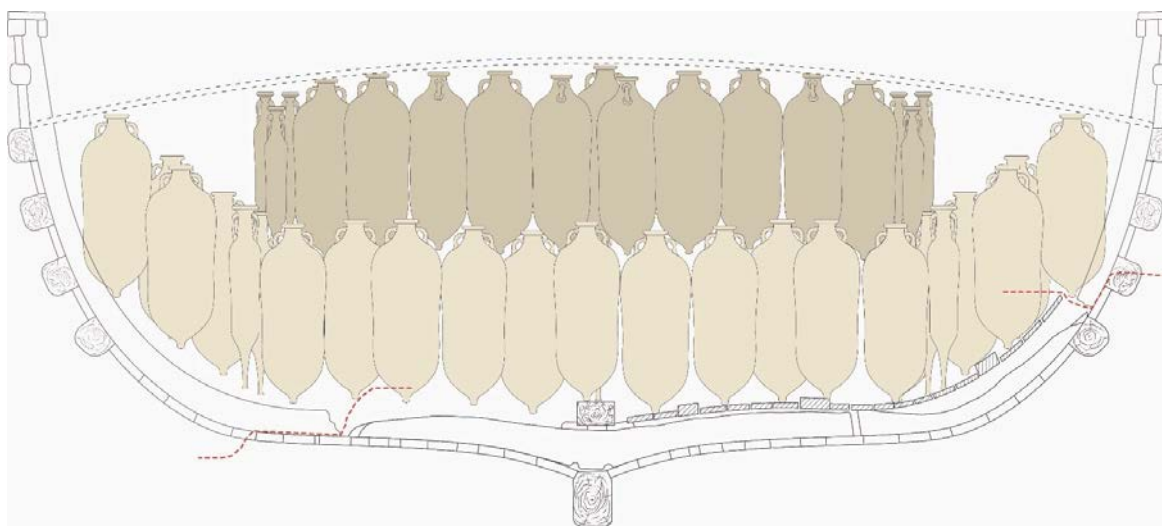
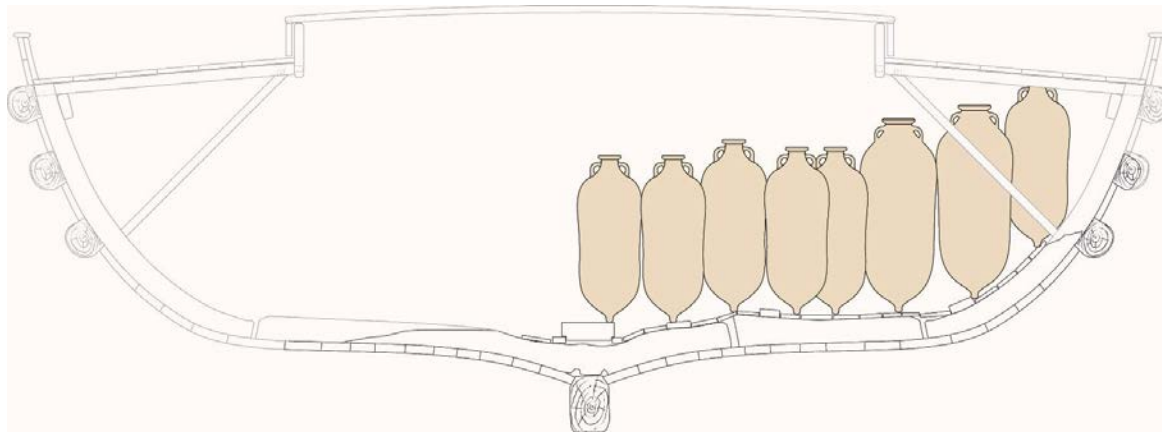
L. Damelet CNRS/CCJ

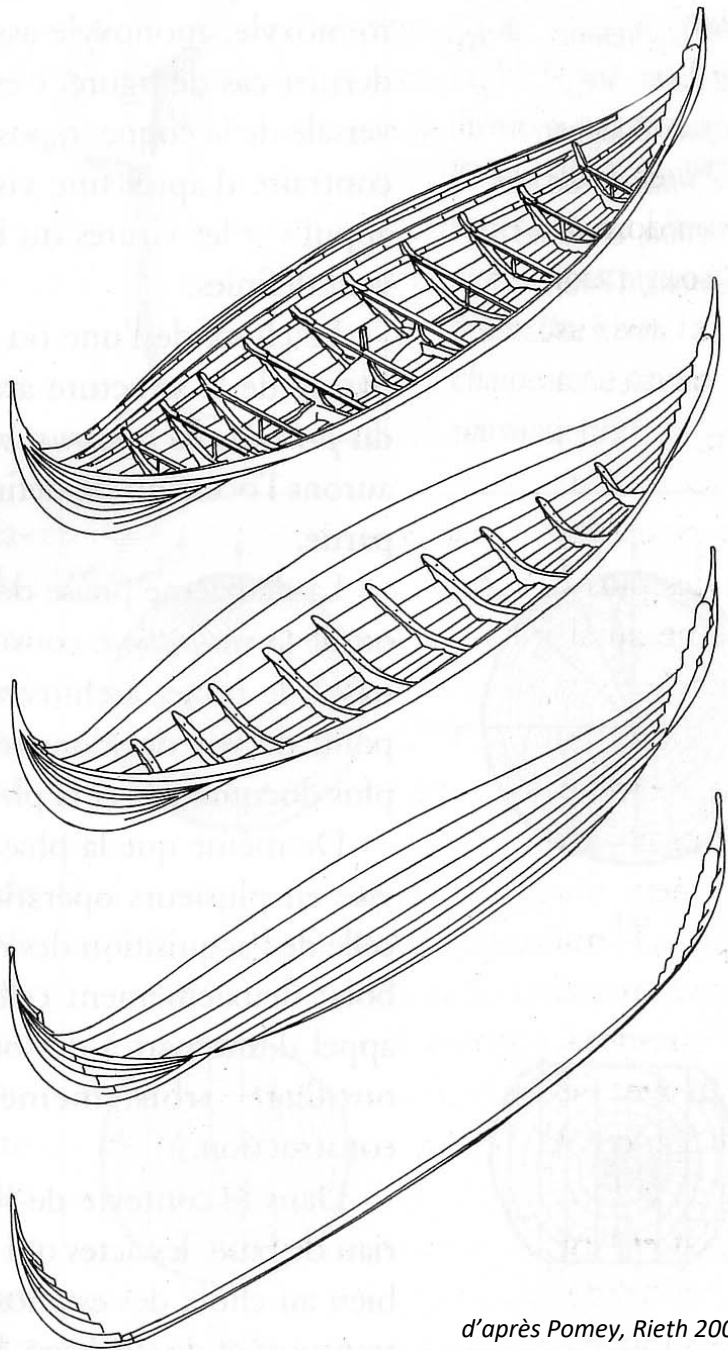


L. Damelet CNRS/CCJ



L. Damelet CNRS/CCJ





*d'après Pomey, Rieth 2005*





**Merci de votre  
attention !**